

Middle Atmosphere Program

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GOSSA:	M. P. McCormick	SSIM:	P. C. Simon
GRATMAP:	D. C. Fritts	SUPER CAMP:	E. Kopp
MAC-EPSILON:	E. V. Thrane	WINE:	U. von Zahn

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M I D D L E
A T M O S P H E R E
P R O G R A M

HANDBOOK FOR MAP

Volume 24

Edited by
Belva Edwards

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Belva Edwards, Administrative Secretary

MAP STUDY GROUPS

- MSG-5 Ions and Aerosols:** The purpose of MSG-5 is to review and evaluate theoretical and experimental studies involving middle atmosphere ions and their relationships to neutral gases and aerosols, and to prepare recommendations for coordinated research projects.
Co-Chairmen: F. Arnold and M. P. McCormick
Members: M. Ackerman, E. Arijs, A. W. Castleman, M. L. Chanin, E. E. Ferguson, D. J. Hofmann, E. Kopp, A. Ono, L. Thomas, R. P. Turco
- MSG-8 Atmospheric Chemistry:** The purpose of MSG-8 is to review and evaluate theoretical and experimental studies of middle atmospheric chemical composition, and to identify areas of future research.
Chairman: G. Witt
Members: J. J. Barnett, G. Brasseur, A. Ebel, E. J. Llewellyn, D. Offermann, C. R. Philbrick, S. Solomon, R. P. Wayne
- MSG-9 Measurement of Middle Atmosphere Parameters by Long Duration Balloon Flights:** The task of MSG-9 is to identify the scientific objectives of long-duration circumpolar balloon flights, and to prepare plans for international participation in measurements in both hemispheres.
Chairman: J. Blamont
Members: J. Eddy, D. H. Ehhalt, M. A. Geller, Yu. P. Koshelkov, K. Labitzke, L. R. Megill, F. S. Rowland, H. E. Volland

MAP PROJECTS

- AMA-** Antarctic Middle Atmosphere Program: The purpose of AMA is to coordinate investigations of dynamics, structure, composition, particle precipitation, middle atmosphere-low atmosphere interactions, and atmospheric pollution of the Antarctic middle atmosphere, and northern-southern polar atmosphere comparisons. Coordinator: T. Hirasawa
- ATMAP-** Atmospheric Tides Middle Atmosphere Program: The purpose of ATMAP is to facilitate the interaction among observationalists, data analysts, theoreticians and modellers in order to elucidate the nature of atmospheric tides on a global scale. Coordinator: J. M. Forbes
- DYNAMICS-** Dynamics of the Middle Atmosphere in Winter: The purpose of DYNAMICS is to coordinate studies of middle atmosphere dynamical quantities and to intercompare basic data obtained from several measurement techniques, with emphasis on disturbed winter conditions. Coordinator: K. Labitzke
- GLOBMET-** Global Meteor Observation System: The aim of GLOBMET is to intensify research in meteor physics and astronomy in the 1980s by making wider use of the latest achievements in this field and expanding international coordination in meteor research. Coordinator: R. G. Roper
- GLOBUS-** Global Budget of Stratospheric Trace Constituents: The purpose of GLOBUS is to coordinate two integrated campaigns to compare results of experimental techniques for measuring stratospheric trace gases, and to measure the latitudinal distribution of trace gases using near simultaneous balloon flights. Coordinator: D. Offermann
- GOSSA-** Global Observations and Studies of Stratospheric Aerosols: The purpose of GOSSA is to coordinate measurements of aerosol characteristics, to disseminate alerts and calendars, to communicate data sets to experimenters, and to organize workshops in order to facilitate data and information exchange. Coordinator: M. P. McCormick
- GRATMAP-** Gravity Waves and Turbulence in the Middle Atmosphere Program: The initial aim of GRATMAP is to plan and coordinate measurement programs designed to delineate the global morphology of gravity waves and turbulence, including geographical and seasonal variability. Coordinator: D. C. Fritts
- MAC-EPSILON-** The project is planned as a case study of middle atmosphere turbulence by means of instrumented sounding rockets, meteorological rockets and ground-based observations. Coordinator: E. V. Thrane

- MAC-SINE-** Middle Atmosphere Cooperation-Summer in Northern Europe: The project will study the general middle atmospheric circulation and temperature structure as well as waves, turbulence and winds during summer solstice conditions in northern Europe.
Coordinator: E. V. Thrane
- MAE-** Middle Atmosphere Electrodynamics: The objective of MAE is the coordination of observations accompanied by laboratory experiments, theoretical studies and modeling in order to elucidate basic physical and chemical processes, electric source mechanisms, and the nature and characteristics of electric coupling between the lower and upper atmospheres.
Coordinator: R. A. Goldberg
- MASH-** Middle Atmosphere of the Southern Hemisphere: MASH is a concerted study of the dynamics of the middle atmosphere in the Southern Hemisphere, with emphasis on interhemispheric differences and connections with the troposphere, using observational data and simulations with numerical models.
Coordinator: A. O'Neill
- NIEO-** New International Equatorial Observatory: The purpose of NIEO is to plan the establishment of an international equatorial observatory equipped with MST radar, lidar and other facilities to study such phenomena as equatorial waves, tides, gravity waves and turbulence and their contribution to the momentum and heat budgets of the equatorial middle atmosphere.
Coordinator: S. Kato
- OZMAP-** Observations of, and Sources of the Spatial and Temporal Variability of Ozone in the Middle Atmosphere on Climatological Time Scales: The aim of OZMAP is to coordinate the preparation of daily synoptic maps of global ozone fields that serve as the basis for a three-dimensional ozone climatology.
Coordinator: D. F. Heath
- SSIM-** Solar Spectral Irradiance Measurements: The purpose of SSIM is to coordinate intercomparisons of solar ultraviolet irradiance measurements, assess the validity of calibration procedures, and propose a definition of a spectral irradiance reference scale for solar ultraviolet measurements.
Coordinator: P. C. Simon
- SUPER CAMP-** This project is a follow-on of CAMP (Cold Arctic Mesopause Project) and will focus on a study of the middle atmosphere above the northern polar region from 50° to 80° during summer, in the effort to understand latitudinal variability of vertical transport, wave dissipation, and its implications on densities of minor constituents.
Coordinator: E. Kopp
- WINE-** Winter in Northern Europe Project: The aim of WINE is to coordinate observational studies of the high-latitude European middle atmosphere in winter, leading to an improved understanding of the winter variability structure, motions, and composition.
Coordinator: U. von Zahn

MAP NATIONAL REPRESENTATIVES

Argentina	S. M. Radicella
Australia	K. D. Cole
Belgium	P. C. Simon
Brazil	B. R. Clemesha
Czechoslovakia	J. Lastovicka
Denmark	J. K. Olesen
Finland	C. Sucksdorff
France	M. L. Chanin
FRG	U. von Zahn
GDR	J. Taubenheim
Hungary	P. Bencze
India	Y. V. Somayajulu
Ireland	P. Lynch
Israel	J. Joseph
Italy	G. Fiocco
Japan	S. Kato
New Zealand	G. Fraser
Norway	E. Thrane
South Africa	G. J. Kuhn
Spain	J. O. Cardus
Sri Lanka	P. A. J. Ratnasiri
Sweden	G. Witt
Taiwan	J. K. Chao
UK	L. Thomas
USA	J. D. Mahlman
USSR	E. S. Kazimirovsky

INTERNATIONAL ORGANIZATIONS ADHERING TO MAP AND THEIR REPRESENTATIVES

COSPAR, Committee on Space Research:
A. D. Danilov, J. C. Gille, K. Labitzke

IAGA, International Association of Geomagnetism and Aeronomy:
J. Taubenheim

IAMAP, International Association of Meteorology and Atmospheric Physics:
I. Hirota, R. G. Roper

IAU, International Astronomical Union:
P. C. Simon

IUPAP, International Union of Pure and Applied Physics:
H. S. Ahluwalia

SCAR, Scientific Committee on Antarctic Research:
T. Nagata

SGOSTEP, Scientific Committee on Solar Terrestrial Physics:
S. A. Bowhill, A. H. Manson

URSI, Union Radio Scientifique Internationale:
T. E. VanZandt, R. A. Vincent

WMO, World Meteorological Organization:
R. D. Bojkov

LISTING OF SCIENTISTS BY COUNTRY

ARGENTINA

Cazeneuve, H. A.
 Giraldez, A. E.
 Machado, M. E.
 Padula-Pintos, V.
 Peres, M.
 Pintado, O. I.
 Radicella, S. M.
 Ricciardi, R. J.
 Sahade, J.
 Samatam, E. L.
 Schneider, O.
 Tasso, J. J.
 Von Wuthenau, F. F.

Whitehead, J. D.
 Wild, J. P.
 Wilkinson, P. J.
 Zillman, J. W.

BRAZIL

Abdu, M. A.
 Clemesha, B. R.
 de Mendonca, F.
 Kantor, I.
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 Muralikrishna, P.
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AUSTRIA

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BELGIUM

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 Koecrelenbergh, A.
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 Lippens, C.
 Melchior, P. J.
 Muller, C.
 Nevejans, D.
 Nicolet, M.
 Pastieis, R.
 Peetersmans, W.
 Sauval, A.-J.
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 Van Bladel, J.
 Van Hemelrijck, E.
 Van Mieghem, J. M.
 Wisemberg, J.
 Zander, R. J.

BULGARIA

Apostalov, E.
 Nesterov, G.
 Panchev, S.
 Ralchovski, T.
 Samardjiev, D.
 Serafimov, K. B.
 Sharov, V.
 Spasov, H.
 Velinov, P.

BURMA

Yin, T.

CANADA

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 Bojkov, R. D.
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 Christie, A. D.
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 Godby, E. A.
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BOLIVIA

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Schiff, H. I.		Hartkamp, H.
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Vallance-Jones, A.		Kaselau, K. H.
Vupputuni, R. K. R.		Klostermeyer, J.
Walker, J. K.		Kohl, H.
CHINA		
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Hao, X.		Otterbein, M.
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Kang-Kun, T.		Paschmann, G.
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Qin, G.-T.	Olesen, J. K.	Reid, I. M.
Qu, Y.-Z.	Peters, B.	Reiter, R.
Shen, C.-S.	Ungstrup, E.	Renger, W.
Tai, H.-S.		Roehrig, O.
Tai, Y.-Q.		Roemer, M.
Tschu, K.-K		Rose, R.
Tso, H.		Ruster, R.
Wang, C.		Schindler, R. N.
Wang, Y.		Schmidt, G.
Wang, Y.-J.		Schmidt, U.
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Xu, C. F.		Schroder, W.
Xu, R. L.		Schuchardt, K. G. H.
EGYPT		
	Ashour, A. A.	Schurath, U.
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	Gouin, P.	Schwentek, H.
FEDERAL REPUBLIC OF GERMANY		
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	Attmannspacher, W.	Siebert, M.
		Speth, P.

Stilke, G.
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Urbarz, H.
Van der Piepen, H.
Vasyliunas, V. M.
Velten, E.
Volland, H. E.
Von Zahn, U.
Warneck, P.
Warnecke, G.
Wendker, J. H.
West, R. M.
Wibberenz, G.
Widdel, H. U.
Wilhelm, K.
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Wright, J. W.
Zetzsch, C.

FINLAND

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Kataja, E. I.
Oksman, J.
Ranta, H.
Sucksdorff, C. G.
Tiuri, M.
Vallinkoski, M.
Vuorela, L. A.

FRANCE

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Morel, P.
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Niemirowicz, Z.
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Petitdidier, M.
Pick, M.
Pillet, G.
Pommereau, J.-P.
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Renoux, A.
Rigaud, P.
Rochas, Dr.
Sheldon, W. R.
Sidi, C.
Simon, P. A.
Teitelbaum, H.
Testud, J.

Thuillier, G.
Vassy, A. T.
Vernin, J.
Vial, F.
Vidal-Madjar, Dr.
Voge, M. J.
Waldteufel, P.
Weill, G. M.

GERMAN DEMOCRATIC REPUBLIC

Bischoff, K.
Bohme, W.
Cossart, G. V.
Entzian, G.
Feister, U.
Glode, P.
Greisiger, K. M.
Grieger, N.
Knuth, R.
Krueger, A. J.
Kruger, W.
Schminder, R.
Schmitz, G.
Sonnenmann, G.
Spankuch, D.
Sprenger, K.
Taubenheim, J.
Wagner, C. U.
Zimmerman, G.

GHANA

Bekoe, D. A.
May, A. N.

GREECE

Repapis, C. C.
Xanthakis, J.
Zerefos, C. S.

HONG KONG

Ho, C.
Lyon, A. J.

HUNGARY

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Dezso, L.

Gombosi, T. I.	Devarajan, M.	Parabrahman, M.
Major, G.	Devasia, C. V.	Pathak, P. N.
Marcz, F.	Dhawan, S.	Pisharoty, P. R.
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	Dutta, R. K.	Prasad, B. S. N.
	Dutta, S. K.	Purkait, N. M.
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	Ghosh, S. N.	Raghavarao, R.
	Gowarikar, V. R.	Rai, D. K.
	Gupta, R. K.	Rai, R. K.
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Acharya, B. L.	Gurm, H. S.	Rajamani, S.
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Agrawal, S. P.	Hingane, L. S.	Rajaram, R.
Ahmed, Md. I.	Indria, Miss	Rajaratnam, P.
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Ananthasayanan, M. R.	Jain, A. R.	Rakshit, D. K.
Angreji, P. J.	Jain, S. L.	Ramachandra Rao, B.
Appu, K. S.	Jain, V. C.	Ramakrishna, S.
Asnani, G. C.	Jani, K. G.	Ramana, K. V. V.
Bahi, A. C.	Jayaraman, A.	Ramana Murty, Bh. V.
Balachandra Swamy, A.	Jayaraman, P. N.	Ramanamurty, Y. V.
Bali, A.	Kasturirangan, K.	Ramanathan, K. R.
Bandyopadhyay, P.	Kesnavamurthy, K. N.	Rao, C. N. R.
Banerjee, A.	Khosho, T. N.	Rao, B. C. N.
Beig, G.	Kotadia, K. M.	Rao, D. R. K.
Bhatnagar, A.	Krishnamurthy, B. V.	Rao, M. N. M.
Bhatnagar, S.P.	Krishnamurthy, K.	Rao, N. P. R.
Bhattacharya, J.C.	Kulshrestha, S. M.	Rao, P. B.
Bhattacharya, K.	Kumar, S.	Rao, P. S. K.
Bhavasar, P. D.	Kundapurkar, R. U.	Rao, U. R.
Bhonsle, R. V.	Kumcu, N.	Rao, V. R.
Biswas, S.	Kurup, M. R.	Rastogi, R. G.
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Chakravarty, S. C.	Lavakare, P. J.	Reddi, R. R.
Chandramma, S.	Mahajan, K. K.	Reddy, B. M.
Chandrasekhar, S.	Mangain, B. N.	Reddy, C. A.
Chatterjee, K.	Mani, A.	Reddy, R. S.
Damle, S. V.	Menon, M. G. K.	Redkar, R. T.
Daniel, R. R.	Mitra, A. P.	Revankar, C. P.
Das, I. M. L	Mitra, S. N.	Saha, B.
Das, P. K.	Modayil, M. A.	Sampath, S.
Dasgupta, A. K.	Mohan, G.	Sarkar, R. P.
Dasgupta, M. K.	Mohanty, S.	Sasi, M. N.
Datta, J.	Mukherjee, B. K.	Satyam, V.
De, S. S.	Murty, A. S. R.	Sehra, P. S.
Deeksnatulu, B.L.	Nagpal, O. P.	Sen, A. K.
Degaonkar, S. S.	Narasimha, R.	Sengupta, K.
Deshpande, B. S.	Narayanan, A.	Seshadri, N.
Deshpande, M. R.	Narayanan, M. S.	Sesnagiri, N.
Deshpande, S. D.	Narayanan, V.	Seshmani, R.
Devanarayanan, S.	Nath, N.	Seshan, T. N.
Devara, P. C. S.	Nerurkar, D. W.	Sethuraman, R.
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	Pant, N.	Sharma, M.

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Singh, R. N.		Kodera, K.
Sinha, M. C.		Kohno, T.
Somayaji, T. S. N.		Koide, T.
Somayajulu, V. V.		Koizumi, T.
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Sreedharan, C. R.		Kuwashima, M.
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Campbell, W. H.	Dubin, M.	Gay, B. W.

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Gelman, M. E.	Hsieh, K. C.	Lazarus, A. L.
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Goldberg, R. A.	Hunsucker, R.	Lehman, R. L.
Golomb, D.	Hunt, D.	Leifer, R.
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Goodman, J. M.	Huntress, W. T.	Levine, D. M.
Goody, R. M.	Husain, L.	Levis, C. A.
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Gossard, E. E.	Ion, H.	Lewis, L. J.
Grams, G. W.	Jackman, C. H.	Lindzen, R.
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Green, J. L.	Japar, S.	Linson, L. M.
Greenberg, L.	Johnson, D. L.	Little, C. G.
Grobecker, A. J.	Johnson, D. W.	Liu, C. H.
Grose, W. L.	Johnson, F. S.	Liu, S.
Guberman, S. L.	Johnson, H. S.	Liu, S. C.
Gurney, E. S.	Jones, L. W.	London, J.
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Hagfors, T.	Kassner, J. L.	Luther, F. M.
Hake, R. D.	Kaufman, F.	Machta, L.
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Hamlin, D. A.	Keitz, E. L.	Madden, R. p.
Hanson, J. E.	Kelley, M.	Maeda, K.
Hanson, W. B.	Kelley, P. L.	Mahlman, J. D.
Hanst, P. L.	Kelly, F. J.	Mak, M. K.
Hard, T. M.	Keneshea, T. J.	Manka, R.
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1	National Plans, PMP-1 Report, PMP-2 Report, PMP-3 Report, Approved MAP Projects	June 1981
2	Symposium on Middle Atmosphere Dynamics and Transport (Extended Abstracts)	June 1981
3	PMP-5 Report, MSG-1 Report, MSG-2 Report, MSG-3 Report, Antarctic Middle Atmosphere Project (AMA), EXOS-C Scientific Observations, WMO Report No. 5, Updated Chapter 2 of MAP Planning Document, Condensed Minutes of MAPSC Meetings	November 1981
4	Proceedings of MAP Assembly held in Edinburgh, 14-15 August 1981, Condensed Minutes of MAP Steering Committee Meetings held in Edinburgh, Proceedings of MAP Open Meeting held in Hamburg, 19 August 1981	April 1982
5	A Catalogue of Dynamic Parameters Describing the Variability of the Middle Stratosphere during the Northern Winters	May 1982
6	MAP Directory	November 1982
7	Acronyms, Condensed Minutes of MAP Steering Committee Meetings, Ottawa, May 1982, MAP Project Reports, National Reports, Committee Reports, PMP and MSG Reports, Workshop Reports, Announcements and Corrigendum	December 1982
8	MAP Project Reports: DYNAMICS, GLOBUS, and SSIM, MSG-7 Report, National Reports: Czechoslovakia, USA	July 1983
9	Papers presented at the URSI/SCOSTEP Workshop on Technical Aspects of MST Radar, May 23-27, 1983, Urbana	December 1983
10	Papers presented at the International Symposium on Ground-Based Studies of the Middle Atmosphere, May 9-13, 1983, Schwerin, German Democratic Republic	May 1984
11	Condensed Minutes of the MAP Steering Committee Meetings held in Hamburg 13-14 August 1983, Research Recommendations for Increased US Participation in the Middle Atmosphere Program, GRATMAP Project Report, MAP Study Group MSG-7 Report	June 1984
12	Coordinated Study of the Behavior of the Middle Atmosphere in Winter (PMP-1) Workshops	July 1984
13	Ground-Based Techniques	November 1984
14	Papers presented at the URSI/SCOSTEP Workshop on Technical Aspects of MST Radar, May 22-25, 1984, Urbana	December 1984
15	Balloon Techniques	June 1985
16	Atmospheric Structure and its Variation in the Region 20 to 120 km: Draft of a New Reference Middle Atmosphere	July 1985
17	Condensed Minutes of MAP Steering Committee Meeting, Condensed Minutes of MAP Assembly, MAP Projects and Study Group Reports, National Reports	August 1985
18	Papers presented at MAP Symposium, November 26-30, 1984, Kyoto (Extended Abstracts)	December 1985
19	Rocket Techniques	March 1986
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21	MAPSC Minutes, ATMAP Workshop, Atmospheric Tides Workshop, MAP/WINE Experimenters Meetings, National Reports: Coordinated Study of the Behavior of the Middle Atmosphere in Winter	July 1986
22	Middle Atmosphere Composition Revealed by Satellite Observations	September 1986
23	Condensed Minutes of MAP Steering Committee Meeting, Toulouse, France, June/July 1986	December 1986
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